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# Two New Species of *Paspalum* (Poaceae: Panicoideae) from Brazil

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**ABSTRACT.** Two new endemic species, *P. cachimboense* from Mato Grosso and *P. goyasense* from Distrito Federal and Goiás, Brazil, are described, illustrated, and compared with putatively related species. Keys to the new species and related taxa of *Paspalum* subg. *Ceresia* are also presented.

**Key words:** Brazil, *Paspalum*, Poaceae, South America.

*Paspalum* L. is a large genus with approximately 330 species. Most of the species grow in the Americas, in tropical and subtropical areas; the genus is particularly abundant in Brazil (Chase, 1929; Pohl, 1980).

During revision of the American species of *Paspalum*, examination of several specimens, collected in central Brazil, revealed the existence of two new species. Both species are here described, illustrated, and compared with species previously included in subgenus *Ceresia* (Persoon) Reichenbach (Chase, 1929, ined.). It should be pointed out that an effort was made to locate specimens of both new species in Brazilian herbaria, such as CEPEC, INPA, R, RB, SP, without success.

***Paspalum cachimboense*** Davidse, Morrone & Zuloaga, sp. nov. TYPE. Brazil. Mato Grosso: Mun. Colider, estrada Santarém-Cuiabá, BR-163, km 762, Serra do Cachimbo a 30 km da cidade de Garantã, 09°35'S, 54°55'W, 19 abr. 1983, cerrado, campo aberto, solo pedregoso, M. N. Silva, I. L. Amaral, J. Lima, O. P. Monteiro & J. Coêlho 24 (holotype, MO). Figure 1.

*Paspalo lancifloro* Trinius simile sed gramine annuo, culmis profuse ramificantibus, rhachidi 2–3 mm lata, spiculis 4–4.3 mm longis, anthoecio supero 2.2–2.5 mm longo differt.

Annual, with geniculate culms 20–60 cm tall, profusely branching at the middle and upper nodes; internodes 5–11 cm long, terete, glabrous; nodes brownish, glabrous. Sheaths 5–8 cm long, usually shorter than the internodes, rounded at the back and keeled toward the distal portion, papillose-pi-

lose in the upper portion, otherwise glabrous, the margins membranous. Ligules 2–3 mm long, hyaline, membranous, glabrous; pseudoligule absent; collar papillose-pilose. Blades linear, 14–19 cm long, 0.4–0.6 cm wide, flat, rounded at the base, the apex acuminate, densely papillose-pilose on both surfaces, the margins ciliate. Peduncles terminal, long-exserted, filiform, up to 20 cm long, terete, glabrous. Inflorescences fasciculate, 5–7 cm long, 2–5 cm wide; main axis absent; pulvini pilose, with a short to lanceolate bract, up to 5 mm long; racemes 1 to 4, solitary to pseudoverticillate, ascendent and divergent, ending in a naked point; rachis of the branches foliaceous, 5–7 cm long, 2–3 mm wide, glabrous, the midnerve purplish and wings hyaline, glabrous; spikelets solitary and imbricated, arranged in 2 series. Spikelets long ellipsoid, 4–4.3 mm long, 1.1 mm wide, acute, papillose-pilose, pale and tinged with purple. Lower glume absent. Upper glume as long as the spikelet, 3-nerved, one nerve central and the other two nerves marginal, papyraceous, with a tuft of whitish hairs, up to 1 mm long, at the base, otherwise glabrous, the base rounded, the margins ciliate on the upper portion, glabrous on the rest of the surface. Lower lemma glumiform, as long as the spikelet, 3-nerved, pilose along the lower margins and with papillose-pilose hairs, up to 2 mm long on the upper third of the lemma, otherwise glabrous, sulcate between the nerves and papillose in the lower half. Lower palea and lower flower absent. Upper antheridium long ellipsoid, 2.2–2.5 mm long, 0.8 mm wide, 1–3 mm shorter than the upper glume and lower lemma, plano-convex, glabrous, membranous, pale, stipitate, the stipe 0.2 mm long; upper lemma with small papillae all over its surface and prickles, microhairs, and macrohairs toward the distal portion; palea with the apex free, with a texture and ornamentation like that of the upper lemma; lodicules 2, ca. 0.3 mm long, conduplicate, hyaline; stamens 3, the anthers 1.5 mm long, stigma 2, plumose. Caryopsis not seen.

The specific epithet alludes to the type locality

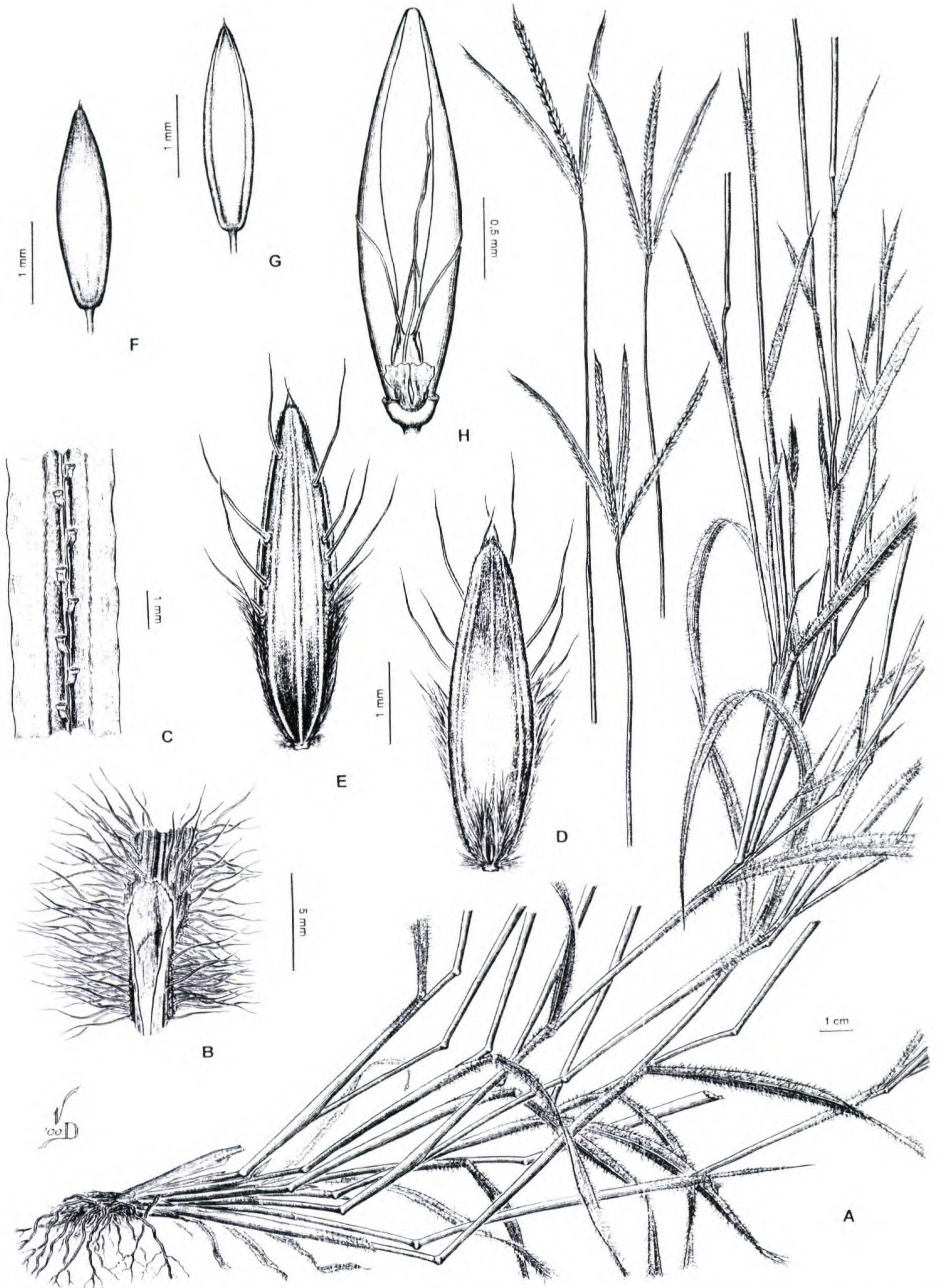


Figure 1. *Paspalum cachimboense* Davidse, Morrone & Zuloaga. —A. Habit. —B. Detail of ligule. —C. Portion of the fertile inflorescence. —D. Spikelet, upper glume view with hairs of the upper lemma on the back. —E. Spikelet, lower lemma view. —F. Upper antherium, dorsal view. —G. Upper antherium, ventral view. —H. Upper palea, lodicules, and gynoecium. (Based on *Silva et al.* 24.)

of this new species, Serra do Cachimbo in central Brazil. The Serra do Cachimbo is located between the states of Pará and Mato Grosso and extends, in a NNW-SSE direction, between 7° and 10° of latitude south, with altitudes ranging from 300 to 570 m. The area where *P. cachimboense* grows is a transitional zone between Amazonia and the typical vegetation of the Central Planalto of Brazil (Lleras & Kirkbride, 1978). In this region the soils are poor with low or no agricultural value. They are typically characterized by the presence of whitish quartzite sands (Soembrock, 1966; Eiten, 1975).

According to Lleras and Kirkbride (1978), the specific site location, where the new species was collected, km 762 of BR-163, is a typical "campina" formation, with dominance of trees 4–6 m tall, such as *Pagamea guianensis* Aublet and *Palicourea nitidella* (Müller Argoviensis) Standley (both Rubiaceae); therefore, *P. cachimboense* is probably restricted to quartzite sandy soils of campinas of Amazonia.

This new species belongs to *Paspalum* subg. *Ceresia*, and within this subgenus, to group *Pectinata* (Chase, ined.), by virtue of possessing inflorescences with a reduced number of racemes, rachis of the racemes foliaceous, spikelets solitary and imbricate, and upper glume winged with flat margins. *Paspalum cachimboense* is closely related to *P. lanciflorum*, because both species have spikelets with rounded bases and a stipitate upper antherium. *Paspalum cachimboense* differs from *P. lanciflorum* by the annual habit of the former (vs. perennial), culms geniculate and conspicuously branched (vs. erect and simple), rachis width 2–3 mm (vs. 5–7 mm), spikelet size 4–4.3 mm (vs. 5.6–7.2 mm), lower lemma with papillae at the lower half (vs. smooth), and upper antherium length being 2.2–2.5 mm (vs. 3.2–4.7 mm) long.

The annual habit is uncommon within subgenus *Ceresia*. Previously it has only been reported in *P. longiaristatum* Davidse & Filgueiras (Davidse & Filgueiras, 1993), an endemic species of serpentine soils of Goiás, with upper glume and lower lemma aristate.

KEY TO DISTINGUISH *P. CACHIMBOENSE* FROM ALLIED SPECIES OF GROUP *PECTINATA*

- 1. Spikelets glabrous . . . . . *P. imbricatum* Filgueiras
- 1'. Spikelets pilose . . . . . 2
- 2(1). Spikelets paired, arranged in 4 series; lower lemma without papillose-pilose hairs on the margins . . . . . *P. reticulinerve* Renvoize
- 2'. Spikelets solitary, arranged in 2 series; lower lemma with prominent papillose-pilose hairs along the margins (except in *P. aspidiotes*, a

- species with one to several long hairs at the apex) . . . . . 3
- 3(2). Upper glume with the base rounded, and with a tuft of dense hairs; upper antherium stipitate, up to 1/2 as long as the spikelet . . . . . 4
- 3'. Upper glume with the base cordate and glabrous; upper antherium not stipitate, about as long as the spikelet . . . . . 5
- 4(3). Annual, with geniculate, profusely branching culms; rachis of the racemes 2–3 mm wide; spikelets 4–4.3 mm long; lower lemma papillose on the lower half; upper antherium 2.2–2.5 mm long . . . . . *P. cachimboense*
- 4'. Perennial, with erect, unbranching culms; rachis of the racemes 5–7 mm wide; spikelets 5.6–7.2 mm long; lower lemma smooth; upper antherium 3.2–4.7 mm long . . . . . *P. lanciflorum*
- 5(3). Upper glume and lower lemma with 1 to several long hairs at the apex, the margins ciliate, not papillose-pilose; upper glume 7- to 9-nerved; lower lemma scabrous . . . . . *P. aspidiotes* Trinius\*
- 5'. Upper glume and lower lemma without long hairs at the apex, the margins papillose-pilose; upper glume 3- to 5-nerved; lower lemma smooth . . . . . 6
- 6(5). Plants 0.35–1 m tall; lower sheaths reddish to brownish, shiny; racemes 2(3), 2–8 cm long; spikelets lanceolate . . . . . *P. pectinatum* Nees ex Trinius
- 6'. Plants 1–1.3 m tall; lower sheaths pale to greenish, not shiny; racemes 5–10, 12–16 cm long; spikelets ovoid . . . . . *P. cordatum* Hackel

\**Paspalum setiglume* Chase was recently considered a synonym of *P. aspidiotes* (Zuloaga & Morrone, in prep.).

***Paspalum goyasense*** Davidse, Morrone & Zuloaga, sp. nov. TYPE: Brazil. Goiás: 25 km E of Cabeceiras (ca. 4 km E of Goiás–Minas Gerais border), cerrado and lake margin, 1000 m, 19 Nov. 1965, H. S. Irwin, R. Souza & R. Reis dos Santos 10524 (holotype, MO). Figure 2.

*Paspalo carinato* Humboldt & Bonpland ex Flügge simile sed laminis linearibus, 8–20 cm longis, 0.2–0.4 cm latis, racemis (1–)2(–3), rhachidi 1–1.6 mm lata, gluma superiori dorsaliter pilosa in dimidio inferiori, differt.

Caespitose perennials; culms 40–65 cm tall, erect, simple, few-noded; internodes 2 to 3, 6–20 cm long, 0.1 cm diam., terete and hollow, glabrous; nodes brownish, densely pilose. Sheaths 3–10 cm long, mostly basal, papillose-pilose or hispid, the margins membranous. Ligules 0.5–0.9 mm long, membranous, brownish, glabrous; pseudoligule absent; collar pilose. Blades linear, 8–20 cm long, 0.2–0.4 cm wide, mostly basal, flat or with involute margins, ascendent and rigid, rounded at the base, the apex acute, densely papillose-pilose on both surfaces, the margins ciliate. Peduncles long-exserted, up to 30 cm long, filiform, pale or tinged with purple. Inflorescences terminal, exserted, with 2 racemes, occasionally with a single raceme or with a third raceme present; racemes alternate, as-

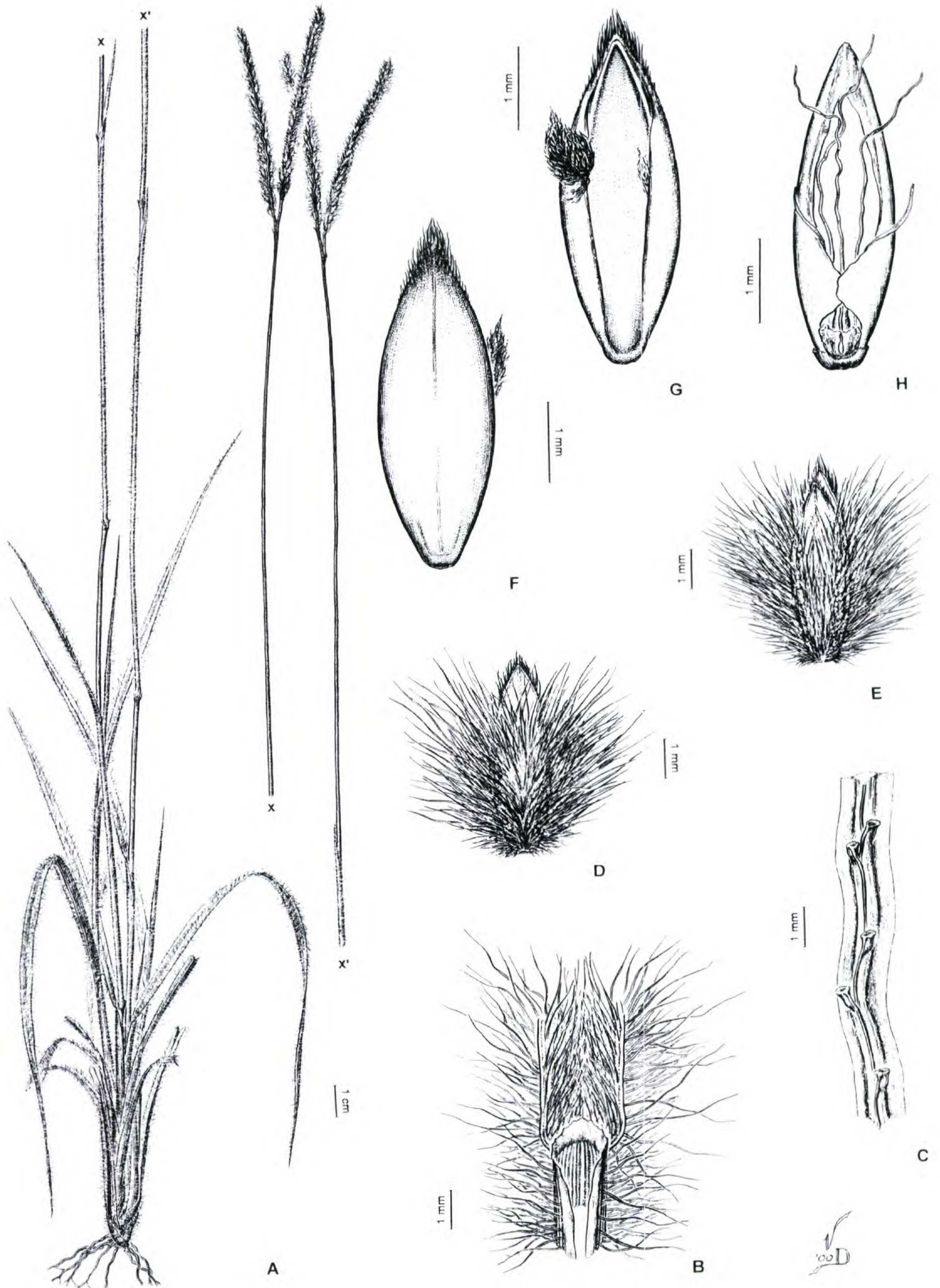


Figure 2. *Paspalum goyasense* Davidse, Morrone & Zuloaga. —A. Habit. —B. Detail of ligule. —C. Portion of the rachis. —D. Spikelet, upper glume view. —E. Spikelet, lower lemma view. —F. Upper antherium, dorsal view with lateral stigmatic plumule. —G. Upper antherium, ventral view with lateral stigmatic plumules. —H. Upper palea, lodicules, and gynoecium. (Based on *Irwin et al.* 10524.)

pendent and divergent; main axis up to 3 cm long, flattened, smooth, glabrous, occasionally absent; pulvini glabrous, with a squamiform bract; rachis of the branches flattened, straight, (2-)3-7 cm long, 1-1.6 mm wide, glabrous, the midnerve wavy, pale to greenish, the wings hyaline, nerveless, pale to purplish, the rachis ending in a developed spikelet; pedicels solitary, short, flattened, glabrous; spikelets solitary, imbricate, in 2 series. *Spikelets* long ellipsoid, 4-5 mm long, 1-1.1 mm wide, exclusive of hairs, plano-convex, acute, pilose, silvery; upper glume and lower lemma densely pilose on the lower half, the hairs whitish, otherwise glabrous, smooth, the margins with papillose hairs up to 2.5 mm long, reduced toward the apex. *Lower glume* absent. *Upper glume* as long as the spikelet, membranous, 3-nerved, the nerves thin, one central, the other two marginal, the apex acute, with or without a short tuft of hairs. *Lower lemma* glumiform, as long as the spikelet or slightly shorter, 3- to 5-nerved, the nerves thin. *Lower palea* and *lower flower* absent. *Upper antherium* long ellipsoid, 3.2-4 mm long, 0.9 mm wide, 0.7-1 mm shorter than the spikelet, plano-convex, cartilaginous; lemma papillate, with small papillae regularly distributed, and a tuft of macrohairs at the apex, the margins flat, not enclosing the upper palea; lodicules 2, ca. 0.3 mm long, conduplicate; stamens 3, the anthers 2 mm long; stigma plumose. *Caryopsis* long obovoid, 2 mm long, 0.9 mm wide; hilum elliptic; embryo 1/3 as long as the caryopsis.

*Paratypes.* BRAZIL. **Distrito Federal:** Brasília, 975 m, 29 Oct. 1965, *Irwin et al.* 9658 (MO, UB); 10 km W of Taguatinga, on road to Braslândia, 1200 m, 25 Nov. 1965, *Irwin et al.* 10654 (MO, UB, US); Chapada da Contagem, ca. 20 km NE of Brasília, 1000 m, 28 Oct. 1965, *Irwin et al.* 9648 (MO, UB); Brasília, 975 m, 13 Nov. 1965, *Irwin et al.* 10257 (MO); Brasília, Lago Azul, Nov. 1988, *Zuloaga* 3835 (SI). **Goiás:** ca. 5 km N of jet. rd. W to Pires do Rio by BR-050, ca. 800 m, 7 Dec. 1988, *Kral et al.* 75939 (MO); without locality, 1896, *Glaziou* 22441 (US, W), 22443 (G, US, W); ca. 14 km S of Corumbá de Goiás, 975 m, 30 Nov. 1965, *Irwin et al.* 10737 (MO).

*Paspalum goyasense* is known from the states of Goiás and Distrito Federal in central Brazil. It occurs in cerrado vegetation between 900 and 1200 msm, in areas where regular fires occur. According to Eiten (1978, 1984), the cerrado is characterized by a clear dry season, between April and September, with nearly 250 mm of rainfall in this period; during the wet season there is an average of 1350 mm. The soils are usually sandy, well drained, and poor in nutrients.

It is likely that this new species also grows in Minas Gerais since it has been collected 25 km

east of Cabeceiras, close to the state border between Goiás and Minas Gerais.

*Paspalum goyasense* also belongs to subgenus *Ceresia* (Chase, ined.), because of its perennial habit, membranous rachis with hyaline wings, spikelets ellipsoid and conspicuously hairy, as well as a cartilaginous upper lemma and palea.

Within *Ceresia*, *P. goyasense* is related to *P. carinatum* Humboldt & Bonpland ex Flügge. *Paspalum carinatum* differs from *P. goyasense* by filiform (vs. linear) leaves of the former, 0.5-1 mm (vs. 2-4 mm) wide; inflorescences with a single raceme, occasionally 2 (vs. 2, occasionally 1 or 3); rachis of the racemes 1.8-2.5(-3) mm (vs. 1-1.6 mm) wide, arcuate (vs. straight); spikelets with the upper glume densely pilose on the lower third, otherwise scaberulous (vs. pilose in the lower half, otherwise glabrous), with the upper glume and lower lemma flattened (vs. slightly convex) on the upper portion.

*Paspalum goyasense* is also related to *P. guttatum* Trinius, a member of the *Eriantha* group, which differs by the latter's ligules 0.2 mm (vs. 0.5-0.9 mm) long, with a ciliate pseudoligule (vs. absent); inflorescences with conjugate racemes (vs. racemes alternate), pulvini pilose (vs. glabrous); spikelets ellipsoid (vs. long ellipsoid), with width 1.5-2 mm (vs. 1-1.1 mm); and upper antherium glabrous and closed at the apex (vs. papillate and gaping).

The specimens *Glaziou* 22441 and 22443 were identified, in sched. by Hackel, as *Paspalum obscurum* Nees var. *albescens* Hackel.

Although *Paspalum goyasense* usually has inflorescences with two non-conjugate racemes, the specimens *Glaziou* 22441, *Glaziou* 22443, and *Irwin et al.* 9648 have floriferous culms with a single raceme, while three racemes were observed in *Zuloaga* 3835.

KEY TO DIFFERENTIATE *PASPALUM GOYASENSE* FROM RELATED SPECIES OF SUBGENUS *CERESIA*

1. Spikelets solitary, the upper glume with hairs up to 3 mm long, irregularly distributed along the margins, these not corky . . . . . 2
- 1'. Spikelets paired, the upper glume uniformly papillose-pilose, with tuberculate hairs 2-7 mm long, the margins corky . . . . . 5
- 2(1). Racemes solitary, occasionally 2 then alternate; spikelets 3.3-5 mm long, with long hairs toward the basal margins, otherwise glabrous; upper antherium 0.6-1.8 mm shorter than the upper glume and lower lemma; adaxial surface of the blade without conspicuous papillae . . . . . 3
- 2'. Racemes 2, conjugate, occasionally with a third raceme; spikelets 1.6-3 mm long, the margins densely pilose toward the distal portion, with hairs up to 2 mm long, shortly pilose toward

- the base; adaxial surface of the blade conspicuously papillose . . . . . 4
- 3(2). Leaf blades linear, 8–20 cm long, 0.2–0.4 cm wide, flat or with involute margins; nodes densely pilose; inflorescences with (1)2(3) racemes; rachis of the racemes 1–1.6 mm wide, straight; spikelets with the lower glume densely pilose in the lower half, otherwise glabrous; upper glume and lower lemma slightly convex . . . . . *P. goyasense*
- 3'. Leaf blades filiform, 5–20 cm long, 0.5–1 cm wide, folded; nodes glabrous to shortly pilose; inflorescence with 1(2) raceme; rachis of the racemes 1.8–2.5(–3) mm wide, arcuate; spikelets with the lower glume densely pilose in the lower third, otherwise scaberulous; upper glume and lower lemma flattened on the upper portion . . . . . *P. carinatum*
- 4(2). Spikelets 1.6–2 mm long . . . . . *P. malmeanum* Ekman
- 4'. Spikelets 2.5–3 mm long . . . . . *P. eucomum* Nees ex Ekman
- 5(1). Leaf blades lanceolate, 5–21 cm long, 0.5–1.8 cm wide; upper glume with marginal hairs uniformly ciliate and of the same length; lower lemma with glabrous margins . . . . . 6
- 5'. Leaf blades linear-lanceolate, 4–13 cm long, 0.1–0.2(–0.5) cm wide; upper glume with short and long hairs on the margins, not uniformly ciliate; lower lemma with the apical margins pilose . . . . . *P. polyphyllum* Nees ex Trinius\*
- 6(5). Inflorescences with 7 to 11 arcuate racemes, the basal ones 6–12 cm long, 0.8–1.2 mm wide; spikelets 0.8–1 mm wide; plants bambusoid, with leaf blades papyraceous, pseudopetiolate . . . . . *P. buchtienii* Hackel
- 6'. Inflorescences usually with 2 to 6 straight ra-

cemes, the basal ones 5–9 cm long, 1.2–1.5 mm wide; spikelets 1.2–1.4 mm wide; plants and leaf blades herbaceous, the blades not pseudopetiolate . . . . . *P. humboldtianum* Flügge  
 \**Paspalum bicilium* Mez and *P. spissum* Swallen were recently considered synonyms of *P. polyphyllum* and *P. carinatum*, respectively (Zuloaga & Morrone, ined.).

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